## Carleton

```
    matt whited, Professor and Chair, Chemistry
mwhited@carleton.edu | 507.222.4530 | research.mwhited.sites.carleton.edu
```

March 31, 2023

Dear Michelle and Members of the FCPC,
We are writing to request approval for a full-time tenure-track hire in Chemistry in the next academic year. As noted in our recent decennial review, our department is in a time of high turnover. Recent and imminent retirements in our department (Table 1) will leave us down 3.1 tenure-track FTE relative to our 2012-2019 staffing, a period when we consistently required $1-2$ visiting instructors per year and saw significant growth in the Biochemistry minor (now averaging more than 25 minors per year and the most popular minor/concentration in more than half of the past 20 years), for which Chemistry provides approximately two-thirds of the staffing.

Table 1. Retirements of Chemistry Faculty

| Name | Sub-Disciplines | Retirement Year |
| :--- | :--- | :--- |
| Marion Cass (0.5 FTE) | inorganic, physical | 2019 |
| Dave Alberg | organic | 2023 |
| Will Hollingsworth | physical | 2024 |
| Trish Ferrett (0.6 FTE) | physical | 2025 (anticipated) |

Recognizing the impact of these retirements, our most recent decennial review noted urgent upcoming hiring needs in organic chemistry and physical chemistry. We were fortunate this year to conduct an open search that yielded Kaz Skubi (an organic chemist beginning in fall 2023) and Tamra Blue (a biochemist and an opportunity hire who will not start full-time until 2026-27, at the end of a postdoctoral appointment).

The most pressing need now is in physical chemistry, addressing gaps and responding to the opportunities afforded by Will's and Trish's upcoming retirements. Will and Trish are currently our only experimental physical chemists, as our other physical chemist, Dani Kohen, is a theorist whose research is in computational chemistry. This hiring request is supported by
(a) continued strong enrollments in Chemistry courses at introductory and advanced levels, accompanied by high numbers of Chemistry majors;
(b) the centrality of physical chemistry in our curriculum at 100-, 200-, and 300-levels, coupled with our desire to bring the perspective of a modern experimental physical chemist as we continue to update our curriculum to address increasingly cross-disciplinary problems in areas such as health, energy, and the environment, that appeal to broad swathes of Carleton students; and
(c) our significant need to provide student research opportunities, particularly in experimental chemistry.


## Background

Physical chemistry is foundational to the study of chemistry; in fact, the majority of concepts taught in our Principles of Chemistry I course are derived from chemical thermodynamics, kinetics, and quantum mechanics (our primary upper-level courses in physical chemistry). Physical chemistry thus serves a broad population of Carleton students, and it is the primary vehicle through which we introduce rigorous quantitative approaches both to introductory and advanced students.

As a consequence of its foundational importance and quantitative rigor, physical chemistry is disproportionately represented among our required 300 -level courses and laboratories, including two courses that are required for the major (CHEM 301 and CHEM 343) and two that are required for ACS certification and are effectively prerequisites for graduate study in chemistry (CHEM 302 and CHEM 344). Will Hollingsworth and Trish Ferrett have played pivotal roles in staffing all four of these courses, in addition to introductory offerings, and they are the only faculty to have taught CHEM 302 in recent years. Thus, for the continuity of our program and our ability to serve both majors and non-majors, it is critical that we be able to fill this position now, ideally allowing one year of overlap with Trish to pass along the accumulated knowledge for these upper-level courses.

In addition to filling significant staffing needs at both the introductory and upper levels, a tenure-track hire in experimental physical chemistry would provide our department the opportunity to grow the discipline in important ways. Modern experimental physical chemistry research addresses a diverse range of important issues in solids and solutions (e.g., behavior of semiconductors in solar cells and processes by which they degrade, distribution and transformations of nanomaterials in the environment, structure and behavior of biomacromolecules) that lie at disciplinary intersections in fields such as materials science, environmental science, and molecular biophysics. Gaining a colleague with expertise in such an area would enable critical growth in our introductory offerings as we connect chemistry to environmental and health issues that interest many Carleton students, and would also provide important research opportunities for students from Chemistry and other majors. Each of our past two decennial reviews has noted the need for more research opportunities in chemistry for Carleton undergraduates, with experimental physical chemistry a particularly glaring omission from our offerings since Will and Trish have not supervised research students in many years. Thus, we and our students are ready to reap significant benefits from the addition of a tenuretrack colleague working at the cutting edge of physical chemistry (and likely interfacing with other disciplines across the college such as Biology, Physics, or ENTS).

## How does this position support he liberal arts at Carleton?

In our recent external review report, the reviewers noted that the Chemistry Department "offers a comprehensive and rigorous curriculum that fully prepares its students for post-college life." We typically graduate a fairly large number of majors (averaging 30 per class over the last $\sim 10$ years) while also serving a large number of pre-health students, Biology, Geology and other science and non-science majors. See Figures 1 and 2 for our Department's context within the college (although these data are approximately 2 years old, enrollments have been consistent and major numbers have increased slightly since the beginning of the COVID-19 pandemic in 2020; see attachment with recent course enrollments for further information).

Figure 1. Number of Declared Majors Compared to Other Programs. (From our 2021-22 self-study report), showing the Chemistry is consistently between the $75^{\text {th }}$ and $90^{\text {th }}$ percentiles.

The red dots and numbers above the dots show the number of majors from Chemistry, and the red percentages under the dots are the percentage of programs with fewer majors than Chemistry. The black rectangles are boxplots showing the distribution of the number of students for each major. The top and bottom of each box show the 75th and 25 th percentiles. $75 \%$ of majors bave a number of majors less than the 75 th percentile, and $25 \%$ of majors bave a number of majors less than the 25 th percentile. The thicker horizontal line inside the box is the median (the 50th percentile). Black dots represent the one or two programs with the highest number in each year



Figure 2. Annual Enrollments in 100- and 200-level Classes Compared to Other Departments, showing that Chemistry serves a large population of students, consistently more than three-quarters of other Carleton departments during the past 10 years. (From our 2021-22 self-study report). Chemistry numbers are in red, similar to Figure 1.

Figure 1 shows that in the past 19 years, Chemistry consistently has more majors than $\sim 85 \%$ (on average) of other Carleton major programs. As demonstrated in Figure 2, we also serve a large number of students in introductory (100- and 200-level) courses. In fact, in 2022-23 we will have enrolled approximately 540 students in 100- and 200level courses (including current enrollments for S23), the largest number in at least 20 years and likely in the history of the department. To accommodate this number of students in introductory courses, we devote a significant fraction of our FTE to 100/200 courses (approximately two-thirds each year), even with fairly large class sizes (up to 48 students for 100-/200-level courses with two lab sections). Our upper-level offerings are also somewhat constrained because the American Chemical Society requires a particular set of courses for program accreditation.

Thus, over the past several years, we have been able to teach our courses only with help from visiting faculty. Since 2012-13 the Department has hired a visiting faculty member for at least one term in every academic year but one, with full-year visitors in seven of those academic years and two full-year visitors in three (2015-16, 2022-23, and 2023-24). Failing to replace the retiring faculty will further increase the need to hire visitors, leaving us struggling and falling short of the commitment that Chemistry tenure-track faculty have made to college and Department service, comps, interdisciplinary programs (Biochemistry and ENTS) and undergraduate research - all of which are critically important to sustaining ourselves, our signature learning experiences, and our broader mission to provide an exceptional liberal-arts education in chemistry that serves a large and diverse set of Carleton students.
Supporting all students in chemistry courses. For many decades, Chemistry has been committed to offering all of those interested in taking our courses the support they need to succeed. We have worked on designing a curriculum with several entry points, and we offer a section of CHEM 123: Principles of Chemistry I with Problem Solving annually. Yet, as discussed in our recent internal self-study and by our external reviewers, we still have work to do in this regard. We are eager to do so, especially in light of Strategy 3.1.8 in Carleton's IDE strategic plan (Strategy 3.1.8 Examine disparities in curriculum structure that hinder student progression through major/minor requirements by increasing opportunities for additional gateway courses throughout the curriculum (e.g. Math 101, courses with problem solving, pre-algebra, English 109). We want to remain leaders at the college in our efforts to do this, and that will require that we replace retiring colleagues with tenure-track colleagues in a timely fashion.

As noted above, modern experimental physical chemistry addresses many important and cross-disciplinary problems of high interest to Carleton students, particularly in areas of health, energy, and the environment. A new experimental physical chemist will play a key role both in teaching 100- and 200-level courses that serve a broad population of students, and we envision that such a person will play a critical role in shaping our curriculum at this level to provide an important lens through which students from many backgrounds can address complex problems in these important areas.

Providing diverse opportunities for student/faculty research. For a variety of reasons, mostly related to changes in faculty status and scholarly interest, there has been a relative reduction in summer research positions for our students in recent years. Nowhere has this strain been more acute than in the area of experimental physical chemistry. From 2011-2021, only 6 summer research students have worked in this area (compared with 49 in biochemistry and 62 in chemical synthesis during the same time period).

The Department believes strongly that offering opportunities for student-faculty chemical research is a crucial part of our mission. We seek to hire faculty members who will launch undergraduate research projects that help us maintain a departmental research program that is excellent and that consistently operates above a "critical mass" of involved students. For many years, we have received applications from approximately $2-3$ times the number of students that we can accept into our summer program. Although we always encourage students to apply for summer research positions at other institutions as well as Carleton, we strongly believe that we need to increase the number of students who participate in on-campus Chemistry research and to broaden the scope of those research opportunities.

## Where does your department or program want to be in 10 or 20 years?

Our department has been a leader for many years in undergraduate chemistry education. ${ }^{1}$ We are dedicated to supporting all our students, majors and non-majors, in preparing them for life after Carleton by helping them to develop strong problem-solving and communication skills and to confront difficult and complex interdisciplinary problems through a chemistry lens. The continued support and modernization of physical chemistry teaching and research at Carleton is critical as we strive to maintain our leadership role and improve the work of our department.

As noted previously, physical chemistry is absolutely foundational to the study of chemistry. Its importance is easily demonstrated in the observation that introductory chemistry courses (such as CHEM 123 and CHEM 224 at Carleton) are dominated by physical chemistry concepts. At the same time, experimental physical chemistry has evolved significantly in the past 30 years. Bringing an experimental physical chemist to Carleton will thus allow us not only to fill our pressing teaching needs but also help to develop our curriculum in important ways that address the complexity of important cross-disciplinary problems that interest modern physical chemists. For instance, we hope that a new colleague will help to modernize the physical chemistry aspects of many courses at the introductory (CHEM 123 and 224) and advanced (CHEM 301, 302, 343, 344) levels, helping to expose students to a broad array of topics in modern physical chemistry (e.g., biophysical chemistry, materials science, nanochemistry, environmental science, and renewable energy).

Similarly, we expect that a new colleague will develop an active research program with Carleton students in experimental physical chemistry. Research in these cutting-edge areas will benefit both chemistry research students and all Carleton students who take chemistry courses, especially given the highly interdisciplinary nature of much modern physical chemistry research. We are also eager to consider candidates whose research engages local and regional communities, which may help further diversify our pool and provide opportunities for Carleton students to engage in community-based learning and research through chemistry. Since the new science facility was intentionally designed to be relatively flexible, we believe that our spaces can accommodate research in most areas of experimental physical chemistry without significant reconfiguration.
Enhancing contributions to interdisciplinary teaching. The Chemistry Department has a formal commitment to teach at least one course per year in the ENTS program (in addition to one yearly offering of CHEM 128, which serves both Chemistry and ENTS). Our commitment to the Biochemistry program has increased to an annual average of 3.33 courses starting in 2022-23. While we want to define this position as broadly as possible in order to cultivate a diverse pool of applicants, we will be particularly interested in candidates whose research and teaching interests can contribute to ENTS, since after Will's and Trish's retirement we will have lost two-thirds of our faculty who have regularly contributed to the ENTS program and we do not currently have a faculty member other than Will to teach CHEM 128: Principles of Environmental Chemistry (which we have previously committed to ENTS to teach once per year).

In general, the most attractive candidates will have research and teaching interests that would overlap with other departments and programs (especially physics, geology, biology, and ENTS) and contribute to cross- and interdisciplinary programs across campus. As we consider candidates, we will be looking to hire those who will not only meet our Department's needs, but who will also integrate well with other programs at Carleton. As mentioned earlier, we will place a high priority on candidates with expertise in newer and interdisciplinary areas of Chemistry, including materials science, nanochemistry, environmental chemistry, and renewable energy, in order to provide our students with opportunities to participate in collaborative research in any of these important areas.

[^0]
## Strategies for recruiting a diverse pool of candidates

In addition to fully supporting the college's commitment to diversifying our faculty as stated in the IDE strategic plan, we feel particularly responsible for pursuing this goal in the sciences. Many of our own Chemistry faculty (including those retiring) have worked for more than a decade, together with faculty in other science departments, to lead, pilot, revise, and teach in cohort and other programs like FOCUS, Summer Science Fellows, and CSSI that have improved the campus climate in the sciences, provided a continuum of support for STEM learning, and increased the diversity of STEM majors. Others have been involved in College-level student programs such as Posse. However, notwithstanding our success in recruiting Tamra Blue this year, Chemistry has still made little progress in hiring tenure-track members from historically excluded groups.

Based on our recent experience and findings from others, we have identified several strategies for recruiting a diverse pool of applicants:

- Formulating the job description as broadly as possible - We intend to advertise this position as searching for someone who will teach either thermodynamics or quantum mechanics (though we expect most applicants will be comfortable teaching both courses), with the hope of recruiting applicants who might fall slightly outside the mainstream of physical chemistry or may even have received a PhD in an adjacent field. As noted above, we are open to considering a wide array of research interests under the broad umbrella of experimental physical chemistry.
- Targeted recruit of excellent candidates prior to postdoctoral research - We and others have found that postdoctoral research experience is critical for faculty starting a research program with undergraduates. At the same time, if we wait to recruit until after applicants have completed postdoctoral appointments, we can miss out on potential excellent additions to our community, either because they accept academic positions elsewhere or do not understand the path into academia at a liberal-arts college like Carleton. We were successful in recruiting Tamra Blue directly, shortly before completion of her PhD , contingent on completion of a postdoctoral appointment before starting at Carleton full-time in 2026-27. While this is a risky strategy in some ways, it also gives access to a pool of applicants that may be invisible to us otherwise.
- Continue to cultivate and leverage diverse networks - Members of the department have been working for more than 10 years to develop networks through professional societies such as The National Organization for Black Chemists and Chemical Engineers (NOBCChE) and The Society for Advancing Chicanos/Hispanics and Native Americans in Science (SACNAS). Our faculty members have participated in the Liberal Arts College Association for Faculty Inclusion (LACAFI), postdoc-to-PUI sessions sponsored by the American Chemical Society and other organizations, and other formal and informal mentoring organizations. Also, as a department, we have maintained an informal list of people from whom to seek advice and candidate names with regard to our hiring. These include faculty in positions that support and produce PhDs who are from groups traditionally underrepresented in STEM, national leaders who can connect us to a network of others, those employed at foundations and professional organizations, and those who mentor potential job candidates as graduate students and postdocs. Our conscious strategy over the past several years of seeking out diversity when inviting speakers for our weekly seminar series (including invitations to graduate-student and postdoctoral speakers representing identities and/or fields of research not currently present in our department) has added a number of names to our list. In fact, this strategy helped us identify and recruit Tamra Blue, whom we hired in our most recent search. We will make sure to explicitly use these connections, while we also continue to leverage our individual professional networks and those of our alumni, many of whom occupy academic positions. We know that these latter networks, while important, are not sufficient for us to have as strong and diverse an applicant pool as we hope to have, but we will not neglect them either.

In addition to the strategies described above for recruiting a diverse pool, we recognize the importance of incorporating evidence-based processes for evaluating a diverse candidate pool. Prior to our last search in fall 2022, members of our department worked to understand best practices from the literature, ${ }^{2}$ to discuss successful practices of other departments at Carleton, and from participating in the recently formed Liberal Arts Colleges Racial Equity Leadership Alliance (LACRELA), which includes 53 liberal arts colleges nationwide. We developed a new rubric for

[^1]candidate evaluation in fall 2022, ensuring that 4 of our 7 areas for evaluation (evidence of potential for teaching effectiveness, citizenship and broader engagement, evidence of interest and commitment to teaching/mentoring/training students of diverse backgrounds, and evidence of potential for effective mentoring) directly incorporated a lens that is consistent with Carleton's IDE plan. We found that these processes, together with the strategies for recruitment discussed above, helped us to bring a notably diverse group of candidates to campus for interviews, and we hope to continue this work in our next hiring process.

Inclusive Hiring Workshop. Our department participated in and Inclusive Hiring Workshop with Dr. Anne Phibbs in spring 2022, prior to our most recent search in fall 2022. The workshop provided a useful opportunity for us to assess our recruitment and evaluation practices. If this request is approved, we are excited to have a chance to participate again, now bringing insights into successes and challenges associated with our last search. We will set aside Friday, June 9 on our calendars to participate in this workshop.

## How will mentoring of the potential hire be handled within your department?

The Chemistry Department has a robust set of practices in place to mentor new tenure-track faculty. In addition to their college-assigned extra-departmental mentor, new members of the department are assigned a specific mentor within the department, usually someone with related research and teaching interests. The fact that multiple faculty teach most of our courses also provides a group of colleagues who will happily exchange ideas about teaching strategies and provide materials from previous iterations of any particular course. New members of our department will also routinely teach courses multiple times during their first several years. Affording them this opportunity is a priority when we create our teaching schedules. As we have done in the past, we will also create other opportunities for mentoring, including class visits by tenured faculty that are not part of formal review, intentional co-teaching assignments, and partnering with the LTC's student observer program, with the goal of tailoring mentoring to each new faculty member's needs.

With a new tenure-track faculty member starting in fall 2023 and likely several others in the next few years, we are working to update our mentoring procedures since we understand that what has worked with our past and current faculty will not necessarily be what we need to do to support a more diverse cohort of new faculty in our department. We plan to continue collaborative work with other departments and the administration to ensure that we implement the best systems for mentoring, professional development, research/teaching support, etc. Many members of our department are involved in programs that will guide us as we develop these new practices, including an NSF-funded Chemistry Early Career Investigator Workshop, organized by Matt Whited and a colleague from UC-Boulder; Deborah Gross's facilitation of department workshops with geoscience/environmental science departments through the Traveling Workshop Program of the National Association of Geoscience Teachers (NAGT); and internal initiatives such as faculty book groups through Carleton's Perlman Learning and Teaching Center (LTC). ${ }^{3}$ We are eager to consider ways of supporting new faculty through revised practices for mentoring (including connecting with mentors outside Carleton in addition to those in our department), support for their possible DEIR work, and more.

[^2]
## Three-Year Staffing Plans

While it is difficult to predict a precise teaching schedule for a department as complex as Chemistry, we can make some reliable predictions about staffing utilization and needs for the next three years.

## 2023-24

- Will Hollingsworth's last year
- Total courses offered by Chemistry: 43
- Visiting faculty: 2 full-time + Tamra Blue teaches for one term prior to postdoc appointment
- Physical chemistry staffing:
- CHEM 301: Kinetics - Dani Kohen (co-taught with Tamra Blue)
- CHEM 302: Quantum Spectroscopy Trish Ferrett
- CHEM 343: Thermodynamics - Trish Ferrett
- CHEM 344: Quantum Chemistry - Will Hollingsworth


## 2024-25 (with new TT hire)

- Trish Ferrett's last year
- Total courses by Chemistry TT faculty: 39 (no planned sabbaticals, several overloads to be repaid)
- Visiting faculty: 1 (possibly less than 3 terms)
- Physical chemistry staffing (possible formulation):
- CHEM 301: Kinetics - Trish Ferrett and an additional faculty member
- CHEM 302: Quantum Spectroscopy New Hire
- CHEM 343: Thermodynamics - Dani Kohen
- CHEM 344: Quantum Chemistry - New Hire


## 2025-26 (with new TT hire)

- Total courses by Chemistry TT faculty: 39
- Visiting faculty: likely 1
- Physical chemistry staffing (possible formulation):
- CHEM 301: Kinetics - Dani Kohen and an additional faculty member
- CHEM 302: Quantum Spectroscopy New Hire
- CHEM 343: Thermodynamics - Dani Kohen
- CHEM 344: Quantum Chemistry - New Hire


## 2024-25 (without new TT hire)

- Trish Ferrett's last year
- Total courses by Chemistry TT faculty: 35
- Visiting faculty: 1-2
- Physical chemistry staffing (possible formulation):
- CHEM 301: Kinetics - Dani Kohen and an additional faculty member
- CHEM 302: Quantum Spectroscopy Trish Ferrett
- CHEM 343: Thermodynamics - Dani Kohen
- CHEM 344: Quantum Chemistry - Trish Ferrett


## 2025-26 (without new TT hire)

- Total courses by Chemistry TT faculty: 34
- Visiting faculty: likely 2 ; one must be physical chemist; staffing CHEM 302 becomes complicated
- Physical chemistry staffing (possible formulation):
- CHEM 301: Kinetics - Dani Kohen and an additional faculty member
- CHEM 302: Quantum Spectroscopy Visitor
- CHEM 343: Thermodynamics - Dani Kohen
- CHEM 344: Quantum Chemistry - Visitor

By 2025-26, our ability to teach upper-level physical chemistry courses would be dramatically affected if this proposed hire is not approved. We would be relying on a visitor to teach two of the upper-level courses that we are committed to offer annually (CHEM 302 and CHEM 344) since they are recommended for majors headed to graduate study and are required for Chemistry majors who want an ACS-certified degree. Our department has historically made a point of utilizing tenure-track faculty to teach courses that fall into this category, with rare exceptions. Moreover, as our only tenure-track physical chemist, Dani Kohen would bear a disproportionate burden in supporting that area of our curriculum, potentially interfering with her ability to offer Principles of Chemistry I with Problem Solving and/or physical chemistry electives such as Computational Chemistry.

## Course Enrollment Data

Attached at the end of this document are course enrollment data for the Chemistry Department for the past three academic years (2019-2022). We have also included enrollment data for the present academic year, using current registration numbers for spring 2023 courses. Most importantly, the attached data make clear that all of our existing courses, those serving the general student population and those targeted at Chemistry majors, are consistently enrolled at or near capacity. Over this 4-year period, our median course has operated at $92 \%$ of capacity (the mean enrollment as a fraction of capacity is $88 \%$ over this period). When considered alongside our consistent need for visiting faculty during the past 10 years, these data clearly show that we have no "flex" in our staffing.

## Summary

In summary, we seek to hire a full-time, tenure-track physical chemist in order to continue to teach our curriculum, to support all of our students, and to increase the number and diversity of research opportunities. While we have specific teaching needs in physical chemistry within the department, we intend to formulate the position in a way that casts a broad net, with the goal of supporting interdisciplinary offerings (especially within ENTS) and recruiting a deep pool that includes many candidates from historically excluded groups. We have a number of old and new strategies to increase the strength and depth of the applicant pool, and we are confident in our ability to mentor a new faculty member as they launch a successful career at Carleton.

As you consider this proposal, please do not hesitate to contact me if I can provide additional information or answer any questions.

Sincerely,
Mo Th Wm
Matthew T. Whited
Associate Professor and Chair, Department of Chemistry
STEM Director

Chemistry Enrollments (F19-S23)

| 19/FA | Registered 236 | Capacity 273 | \%Capacity | 20/WI | Registered 233 | Capacity 289 | \%Capacity | 20/SP | Registered 299 | Capacity 342 | \%Capacity |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| CHEM. 122.00 | 24 | 24 | 100\% | CHEM.113.52 | 14 | 20 | 70\% | CHEM.123.52 | 22 | 24 | 92\% |
| CHEM.128.52 | 24 | 24 | 100\% | CHEM.123.52 | 19 | 24 | 79\% | CHEM.123.54 | 24 | 24 | 100\% |
| CHEM.128.59 | 11 | 24 | 46\% | CHEM.123.54 | 18 | 24 | 75\% | CHEM.123.59 | 21 | 24 | 88\% |
| CHEM.224.54 | 23 | 24 | 96\% | CHEM.123.59 | 23 | 24 | 96\% | CHEM.224.53 | 24 | 24 | 100\% |
| CHEM. 224.59 | 24 | 24 | 100\% | CHEM.233.54 | 22 | 24 | 92\% | CHEM.224.54 | 21 | 24 | 88\% |
| CHEM. 233.52 | 23 | 22 | 105\% | CHEM.233.59 | 22 | 24 | 92\% | CHEM. 224.59 | 20 | 24 | 83\% |
| CHEM. 233.54 | 23 | 22 | 105\% | CHEM.234.52 | 21 | 24 | 88\% | CHEM. 234.52 | 23 | 20 | 115\% |
| CHEM.233.57 | 23 | 22 | 105\% | CHEM.234.57 | 24 | 24 | 100\% | CHEM. 234.57 | 21 | 20 | 105\% |
| CHEM.301.01 | 8 | 8 | 100\% | CHEM. 302.01 | 7 | 8 | 88\% | CHEM. 320.00 | 37 | 40 | 93\% |
| CHEM. 301.02 | 8 | 8 | 100\% | CHEM. 302.02 | 6 | 8 | 75\% | CHEM. 321.01 | 13 | 16 | 81\% |
| CHEM. 301.03 | 6 | 8 | 75\% | CHEM. 302.03 | 7 | 8 | 88\% | CHEM. 321.02 | 15 | 16 | 94\% |
| CHEM. 301.04 | 4 | 8 | 50\% | CHEM. 302.04 | 8 | 8 | 100\% | CHEM. 348.00 | 11 | 12 | 92\% |
| CHEM. 343.00 | 20 | 40 | 50\% | CHEM. 306.01 | 4 | 8 | 50\% | CHEM. 349.01 | 5 | 6 | 83\% |
| CHEM. 361.00 | 15 | 15 | 100\% | CHEM. 306.02 | 5 | 8 | 63\% | CHEM. 349.02 | 6 | 6 | 100\% |
|  |  |  |  | CHEM. 330.00 | 5 | 8 | 63\% | CHEM. 350.00 | 16 | 25 | 64\% |
|  |  |  |  | CHEM. 331.00 | 5 | 15 | 33\% | CHEM. 351.00 | 13 | 25 | 52\% |
|  |  |  |  | CHEM. 344.00 | 23 | 30 | 77\% | CHEM. 352.01 | 3 | 6 | 50\% |
|  |  |  |  |  |  |  |  | CHEM.352.02 | 4 | 6 | 67\% |
|  | Registered | Capacity | \%Capacity | 21/WI | Registered 263 | Capacity | \%Capacity | 21/SP | Registered 279 | Capacity 304 | \%Capacity |
| 20/FA | 215 | 246 |  |  |  |  |  |  |  |  |  |
| CHEM. 122.00 | 24 | 26 | 92\% | CHEM.123.53 | 22 | 24 | 92\% | CHEM.123.52 | 19 | 24 | 79\% |
| CHEM.123.54 | 21 | 24 | 88\% | CHEM.123.54 | 18 | 24 | 75\% | CHEM.123.57 | 14 | 24 | 58\% |
| CHEM.123.59 | 12 | 24 | 50\% | CHEM.123.59 | 24 | 24 | 100\% | CHEM.224.54 | 21 | 24 | 88\% |
| CHEM.224.54 | 20 | 24 | 83\% | CHEM.224.52 | 11 | 24 | 46\% | CHEM.224.59 | 21 | 24 | 88\% |
| CHEM. 224.59 | 21 | 24 | 88\% | CHEM.224.57 | 9 | 24 | 38\% | CHEM.234.54 | 24 | 20 | 120\% |
| CHEM. 233.52 | 12 | 12 | 100\% | CHEM.233.53 | 8 | 12 | 67\% | CHEM. 234.57 | 13 | 12 | 108\% |
| CHEM. 233.53 | 6 | 6 | 100\% | CHEM.233.54 | 23 | 21 | 110\% | CHEM. 234.59 | 21 | 20 | 105\% |
| CHEM.233.54 | 11 | 12 | 92\% | CHEM.233.59 | 20 | 21 | 95\% | CHEM.306.01 | 6 | 8 | 75\% |
| CHEM.233.57 | 12 | 12 | 100\% | CHEM. 234.52 | 18 | 21 | 86\% | CHEM.306.02 | 6 | 8 | 75\% |
| CHEM.233.59 | 10 | 12 | 83\% | CHEM. 234.57 | 12 | 12 | 100\% | CHEM. 320.00 | 53 | 40 | 133\% |
| CHEM.233.63 | 3 | 6 | 50\% | CHEM. 289.00 | 13 | 25 | 52\% | CHEM. 321.01 | 15 | 16 | 94\% |
| CHEM. 301.52 | 8 | 8 | 100\% | CHEM. 302.01 | 8 | 8 | 100\% | CHEM. 321.02 | 15 | 16 | 94\% |
| CHEM.301.54 | 8 | 8 | 100\% | CHEM. 302.02 | 8 | 8 | 100\% | CHEM. 321.03 | 16 | 16 | 100\% |
| CHEM.301.57 | 8 | 8 | 100\% | CHEM. 302.03 | 7 | 8 | 88\% | CHEM. 351.00 | 11 | 25 | 44\% |
| CHEM. 301.59 | 6 | 8 | 75\% | CHEM. 302.04 | 8 | 8 | 100\% | CHEM. 352.01 | 3 | 6 | 50\% |
| CHEM.343.00 | 33 | 32 | 103\% | CHEM. 330.00 | 7 | 8 | 88\% | CHEM. 352.02 | 6 | 6 | 100\% |
|  |  |  |  | CHEM. 331.01 | 3 | 4 | 75\% | CHEM. 362.02 | 15 | 15 | 100\% |
|  |  |  |  | CHEM. 331.02 | 4 | 4 | 100\% |  |  |  |  |
|  |  |  |  | CHEM. 344.00 | 31 | 30 | 103\% |  |  |  |  |
|  |  |  |  | CHEM.358.00 | 9 | 20 | 45\% |  |  |  |  |

## Chemistry Enrollments (F19-S23)

|  | Registered |  | \%Capacity |  | Registered | Capacity | \%Capacity |  | Registered | Capacity | \%Capacity |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 21/FA | 249 | 280 |  | 22/WI | 250 | 292 |  | 22/SP | 258 | 272 |  |
| CHEM. 122.00 | 29 | 30 | 97\% | CHEM.123.52 | 22 | 24 | 92\% | CHEM.123.52 | 22 | 24 | 92\% |
| CHEM.123.52 | 23 | 24 | 96\% | CHEM.123.54 | 22 | 24 | 92\% | CHEM.123.57 | 22 | 24 | 92\% |
| CHEM.123.57 | 22 | 24 | 92\% | CHEM.123.57 | 23 | 24 | 96\% | CHEM.224.54 | 22 | 24 | 92\% |
| CHEM.224.54 | 21 | 24 | 88\% | CHEM. 224.54 | 13 | 24 | 54\% | CHEM.224.59 | 19 | 24 | 79\% |
| CHEM. 224.59 | 12 | 24 | 50\% | CHEM. 224.59 | 13 | 24 | 54\% | CHEM. 234.54 | 12 | 22 | 55\% |
| CHEM. 233.52 | 20 | 22 | 91\% | CHEM. 233.54 | 20 | 22 | 91\% | CHEM.234.59 | 16 | 22 | 73\% |
| CHEM. 233.54 | 24 | 22 | 109\% | CHEM. 233.59 | 17 | 22 | 77\% | CHEM.306.54 | 8 | 12 | 67\% |
| CHEM. 233.59 | 8 | 22 | 36\% | CHEM. 234.52 | 22 | 22 | 100\% | CHEM.306.59 | 9 | 12 | 75\% |
| CHEM.301.01 | 8 | 8 | 100\% | CHEM. 234.57 | 18 | 22 | 82\% | CHEM. 320.00 | 42 | 40 | 105\% |
| CHEM.301.02 | 8 | 8 | 100\% | CHEM. 302.01 | 10 | 8 | 125\% | CHEM. 321.01 | 12 | 8 | 150\% |
| CHEM.301.03 | 8 | 8 | 100\% | CHEM. 302.02 | 9 | 8 | 113\% | CHEM. 321.02 | 11 | 8 | 138\% |
| CHEM.301.04 | 8 | 8 | 100\% | CHEM. 330.00 | 21 | 24 | 88\% | CHEM. 351.00 | 22 | 25 | 88\% |
| CHEM. 301.05 | 8 | 8 | 100\% | CHEM. 331.01 | 11 | 12 | 92\% | CHEM. 352.01 | 6 | 6 | 100\% |
| CHEM. 343.00 | 40 | 40 | 100\% | CHEM. 331.02 | 10 | 12 | 83\% | CHEM. 352.02 | 6 | 6 | 100\% |
| CHEM. 360.00 | 10 | 16 | 63\% | CHEM. 344.00 | 19 | 20 | 95\% | CHEM.363.00 | 29 | 15 | 193\% |
|  | Registered | Capacity | \%Capacity |  | Registered | Capacity | \%Capacity |  | Registered | Capacity | \%Capacity |
| 22/FA | 249 | 280 |  | 23/WI | 292 | 336 |  | 23/SP | 219 | 247 |  |
| CHEM. 122.00 | 26 | 30 | 87\% | CHEM.123.52 | 23 | 24 | 96\% | CHEM.123.52 | 22 | 24 | 92\% |
| CHEM.123.52 | 23 | 24 | 96\% | CHEM.123.54 | 23 | 24 | 96\% | CHEM.123.57 | 16 | 24 | 67\% |
| CHEM.123.57 | 21 | 24 | 88\% | CHEM.123.59 | 24 | 24 | 100\% | CHEM. 128.00 | 7 | 24 | 29\% |
| CHEM.224.54 | 22 | 24 | 92\% | CHEM. 224.52 | 17 | 24 | 71\% | CHEM. 224.54 | 24 | 24 | 100\% |
| CHEM. 224.59 | 24 | 24 | 100\% | CHEM. 224.57 | 18 | 24 | 75\% | CHEM. 224.59 | 24 | 24 | 100\% |
| CHEM. 233.52 | 24 | 24 | 100\% | CHEM. 233.54 | 25 | 22 | 114\% | CHEM. 234.52 | 14 | 22 | 64\% |
| CHEM. 233.54 | 22 | 24 | 92\% | CHEM. 233.59 | 23 | 22 | 105\% | CHEM. 234.54 | 21 | 22 | 95\% |
| CHEM. 233.59 | 19 | 24 | 79\% | CHEM. 234.52 | 24 | 22 | 109\% | CHEM. 234.57 | 22 | 22 | 100\% |
| CHEM.301.01 | 7 | 8 | 88\% | CHEM. 234.57 | 22 | 22 | 100\% | CHEM. 348.00 | 16 | 12 | 133\% |
| CHEM. 301.02 | 7 | 8 | 88\% | CHEM. 289.00 | 12 | 25 | 48\% | CHEM. 349.01 | 8 | 6 | 133\% |
| CHEM. 301.03 | 9 | 8 | 113\% | CHEM. 302.01 | 10 | 10 | 100\% | CHEM. 349.02 | 8 | 6 | 133\% |
| CHEM.301.04 | 7 | 7 | 100\% | CHEM. 302.02 | 10 | 10 | 100\% | CHEM. 351.00 | 25 | 25 | 100\% |
| CHEM. 343.00 | 24 | 25 | 96\% | CHEM. 330.00 | 16 | 24 | 67\% | CHEM. 352.01 | 6 | 6 | 100\% |
| CHEM.338.00 | 6 | 8 | 75\% | CHEM. 331.01 | 7 | 12 | 58\% | CHEM. 352.02 | 6 | 6 | 100\% |
| CHEM. 371.00 | 8 | 18 | 44\% | CHEM. 331.02 | 9 | 12 | 75\% | BIOC. 311.00 | 12 | 12 | 100\% |
|  |  |  |  | CHEM. 344.00 | 29 | 35 | 83\% | BIOC. 331.01 | 15 | 12 | 125\% |
|  |  |  |  | BIOC. 301.00 | 16 | 40 | 40\% | BIOC.331.02 | 13 | 12 | 108\% |


[^0]:    ${ }^{1}$ For instance, although this is not the sole or even most important metric, Carleton has been the leader among our peers in graduating students who go on to earn Chemistry PhDs by a large margin (nearly $50 \%$ more than our closest peer, Harvey Mudd College).

[^1]:    ${ }^{2}$ For example: S. Laursen and A. E. Austin (2020). Building Gender Equity in the Academy: Institutional Strategies for Change, Johns Hopkins University Press. and A.J. Stewart and V. Valian (2018). An Inclusive Academy: Achieving Diversity and Excellence, The MIT Press.

[^2]:    ${ }^{3}$ For instance, a recent book group co-led by Matt Whited: V. L. Baker, G. Nelson, M. J. Pifer, A. L. Terosky (2018). Success After Tenure: Lessons in Engaging Mid-Career Faculty, Stylus.

